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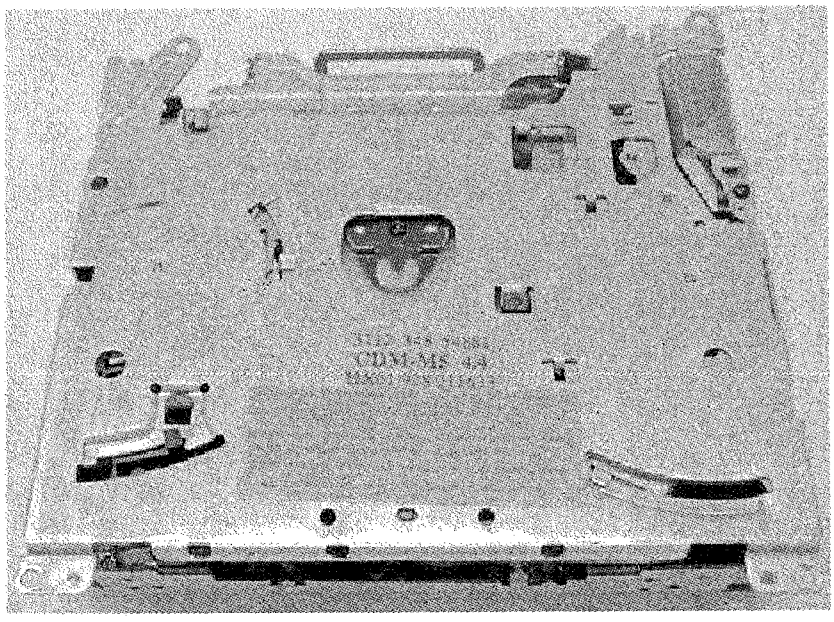
CD Module CDM-M5/4.1/4.4

Service Manual

12 V



PCS 106 186

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WARNINGS

CLASS 1
LASER PRODUCT

DANGER
Invisible Laser radiation when open.
AVOID DIRECT EXPOSURE TO BEAM

ATTENTION
Static Sensitive Devices
Handle Only at Static
Safe Work Stations

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1. GENERAL

The CDM-M5 is a full-logic µP- and servo-controlled CD module. The module is controlled by the headset via the standardized I²C bus. The mechanical part is the same for both versions; the table (see section 3) gives an overview of the different connector types, supply voltages and outputs.
The CDM-M5 has a so-called 'Pirouette' loading mechanism. This means that the CD is loaded and ejected with help of a roller which touches only the edge of the CD instead of the disc surface.
This guarantees an absolute scratch-free loading and ejecting of the CD.
Other built-in protections are against: 2nd disc insertion, 8cm disc insertion and mechanism damage when inserting a CD during power-off.
The CDM-M5/4.1 and CDM-M5/4.4 are mechanically equal to each other. The difference between both versions consists in the output: the CDM-M5/4.1 has an analogue output, whereas the CDM-M5/4.4 has a digital output.
Refer also to section 3.

2. TECHNICAL SPECIFICATIONS

Operating voltages	:	*Refer to table (section 3)*	
Crosstalk suppression	:	≥ 60dB	}
THD	:	≥ 55dB typ.	} - ONLY for CDM-M5/4.1
S/N ratio	:	≥ 87dB (A-weighted)	}
Bus interface	:	I²C	
Access times			
Start up	:	2 sec typ.	
Load to play	:	4 sec typ.	
Play to eject	:	4 sec typ.	
Operating temperature	:	-15°C....+65°C	
Operating angle	:	-10° ....+30°	
Weight	:	approx. 600g	

3. OVERVIEW OF CDM-M5 VERSIONS

Version	Control Connector	Audio / Data Connector	Supply Voltage V1	Supply voltage V2	Remarks
/4.1	14-pole AMP MICRO MATCH	Combined with Control connector	7.5 – 8.5VDC 8.0VDC nom.	3.1 – 3.6VDC 3.3VDC nom.	Analogue audio output
/4.4	12-pole AMP MICRO MATCH	Combined with Control connector	7.5 – 8.5VDC 8.0VDC nom.	3.1 – 3.6VDC 3.3VDC nom.	Digital S/P DIF output

For connector pin layouts, see further on in this manual.

4. MAINTENANCE

Remark: *all position numbers of the main assy are given as normal fonts; position numbers of the pick-up assy are underlined.*

4.1 Cleaning and lubrication

The CD module mechanism requires cleaning and lubrication after each repair. In other cases this is not necessary.

4.2 Cleaning with alcohol

- *Note: Use fluff-free Q-tips !*
- Turntable wheel pos. 14.
- Disc clamp assy pos. 2.
- Lens of pickup (laser) unit pos. 4.

4.3 Lubrication overviews

See section concerned further on in this manual.

5. CHECKS

5.1 Equipment required

- Test CD's:
  - SBC442 - 4822 397 30155
  - SBC444/444A - 4822 397 30245
  - Audio Signals disc1 SBC429
    - 4822 397 30184
  - A-BEX TCD721 (white scratch)
  - Philips 8A (double black dot)
  - Max. thickness - 4822 397 30275
  - Min. thickness - 4822 397 30276
  - Skew disc - 4822 397 30277
  - Eccentr. 200µm - 4822 397 30278
  - Max. radius - 4822 397 60141

The CD module should be tested while connected to a suitable radio set.

5.2 Access times

- Use the test CD SBC442.
- Maximum times should be:
  - 'Load to Play': 6 sec
  - Start up: 3 sec
  - Switch track1 → track 2: 2 sec
  - Switch track1 → track 20: 4 sec
  - Play → standby: 3 sec
  - Standby → eject: 3 sec
- If one or more times exceed the maximum value, check (gear) wheels pos. 5-9 + 51, feed gear assy pos. 10/11 and drive gear pos. 13 and replace the CD module if necessary. Check also the servo- and sledge (feed) motors (resp. pos. 3 and 5).

5.3. Black dot

- Use test CD SBC444A with simulated black dot of typ.1000µm.
- No 'hitching' may occur now during play.

5.4 Double black dot

- Use test CD Philips 8A with simulated black dots of 600 + 300 µm.
- No 'hitching' may occur now during play.

5.5 Information layer interruption

- Use test CD SBC444A with simulated interruption of typ. 1000 µm.
- No 'hitching' may occur now during play.

5.6 Simulated fingerprint

- Use test CD SBC444A with simulated finger-print (tracks 18 and 19).
- No 'hitching' may occur now during play.

5.7 'White' scratch

- Use test CD A-BEX TCD721 with a white scratch of typ. 1000 µm.
- No 'hitching' may occur now during play.

5.8 Eccentricity

- Use test CD with 200 µm eccentricity.
- No audible distortion, wow or flutter may be heard now.

5.9 Thickness

- Use the 'max.- and min. thickness' test CD's.
- The module should load these discs properly and no audible distortion, wow or flutter may be heard now.

5.10 Track attainability

- Use 'Audio signals' test CD.
- Track no. 99 should be reached without problems.

When one or more specifications mentioned in **'5.3' -'5.10'** are not met, check the sledge (feed) assy pos.5/6/10-13, spindle motor pos. 7 and pick-up unit pos. 4.
Replace the CD module if necessary.

For more information refer to the manual: 'General Check and Alignment Procedures' 4822 725 25456.

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6. DISASSEMBLY PROCEDURE

Important: *Before disassembling the CD module, lay the module with the pcb side up, unless otherwise noted. Use a 'clip' and put it on the flex foil.*
Close the solder bridge on the flex foil of the pick-up (laser) unit assy pos.4 of the drive assy pos. 80.
First the rear bracket pos.11 should be removed!

For re-assembling, follow the procedures in reverse order. Take care that the wires, cams etc. are in the right position again after re-assembling.
For the exact position of the parts, refer to the exploded views.
In the description hereafter, all position numbers which are valid for the CDM-M5/4.1 have normal fonts, those which apply to the CDM-M5/4.4, have **bold** fonts. Where only one position number is given, then this number is valid for the CDM-M5/4.1 and CDM-M5/4.4 as well. Position numbers of the pick-up unit parts are underlined.

6.1 CD pcb pos. 95 / 78

- Remove cable assy pos. 94 / **79**.
- Remove flexfoil of drive assy pos. 80 from the (pcb) connector.
- Unplug the cables of the spindle- and sledge motor of pos. 80 and the servo motor pos. 3.
- Remove the two screws pos. 38.
- Pull the left part of the pcb slightly backward, lift it and take the pcb out.

6.2 Front bracket assy pos.1

- First remove the CD pcb (see **'6.1'**).
- Remove the two fixation screws pos. 23.
- Loosen the three springs pos. 17 and 48 from the pivots of the bracket.
- Pull off the damper from the pin of pos. 80.
- Clean the pins.
- Take front bracket away.
- When re-assembling, put some spirit on the damper fixation pivots to make it easier to fix the damper.
- *Use new springs for pos. 17 and 48!*

6.3 Rear bracket pos. 11

- Remove the two fixation screws pos. 23.
- Loosen the adhesive tapes and remove the servo motor cable wires.
- Pull off the two dampers from the pins of pos. 80.
- Clean the pins.
- Take rear bracket away.
- When re-assembling, put some spirit on the damper fixation pivots to make it easier to fix the dampers.

6.4 Drive assy pos. 80

- First remove the pcb and brackets as described in **'6.1'**, **'6.2'** and **'6.3'**.
- Remove the protection rod pos. 41.
- Unhook the two springs pos. 22.
- Supply the servo motor with a DC voltage of approx. 3...5V ('+' to motor terminal marked by red dot), to have the motor run so that command slider pos. 26 moves backward; and hold roller pos. 8 andpush guiding / lever pos. 14/15 and press touch lever pos. 39 simultaneously.
- Alternative method:
  Remove *the* servo motor by removing fixation screw pos. 23 and pulling the worm pulley side upwards; thereafter turn swing wheel pos. 51 until it grasps in the cam of pos. 26; hold roller pos. 8 and the guiding / lever pos. 14/15 and press touch lever pos. 39 simultaneously; turn pos. 8 anti-clockwise until locking left pos. 27 moves to the right.
- As soon as pos. 27 moves to the right, the drive assy can be taken out.
- When re-assembling, *use new springs for pos. 17, 22 and 48!*

>> *Refer to the next section for the spring mounting procedure.*

Important: *After re-assembling,* ***DON'T FORGET*** *to remove the solder bridge from the pick-up unit pos. 4!*

7. SPRING MOUNTING PROCEDURE

Important notes:

- *Take care of a proper ground connection of the CDM module during all actions for a good ESD protection*
- *Mark the change and the right CDM module mounting position on the top side of the CDM module!*

7.1 Disassembly / Reassembly sequence

- Pull out the rear suspension spring by using a pair of tongs *(figures i and ii)*.
- Unscrew the two pcb fixation screws and swing the pcb 180° above the rear bracket *(figures iii and iv)*.
- Pull out the front suspension – and the auxiliary springs by using a pair of tongs (in the same way as it is shown for the rear suspension spring in figure ii) *(figure v)*.
- Hang up the front suspension – and the auxiliary springs in the hooks of the drive assy pos. 80 by using a pair of sharp tweezers (type: EREM 00 d SA) *(figures vi and vii)*.
- Spread of the lever left and the driving lever by using a CD ('Max. thickness' test CD 4822 397 30275 to be preferred) *(figure viii)*.
  Note: *This is necessary because otherwise there exists the risk of damaging the pcb switches !!*
- Swing the pcb and assemble it in the slots in the top cover *(figure ix)*.
- Pull out the CD and assemble the pcb in the final position by re-inserting the two pcb fixation screws *(figures iii and x)*.
- Hang up the front suspension – and the auxiliary springs in the hooks of the front bracket by using a pair of sharp tweezers (type: EREM 00 d SA) *(figures vi and vii)*.
- Hang up the rear suspension springs in the hooks of the top cover and drive assy by using a pair of sharp tweezers (type: EREM 00 d SA) *(figures vi and vii)*.

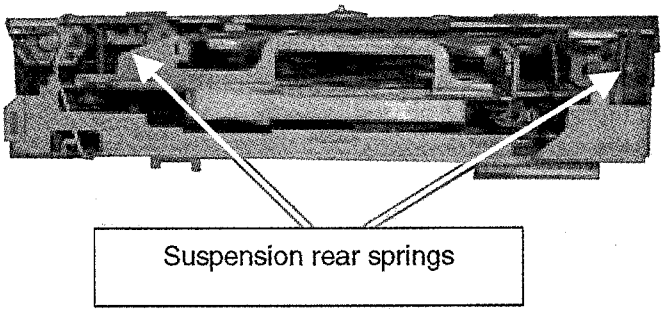

Figure i

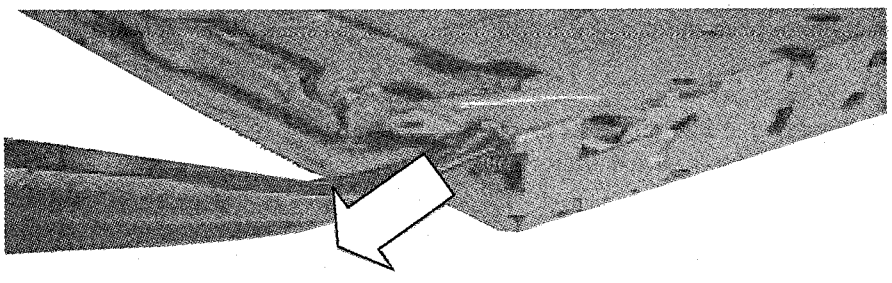

Figure ii

Pull out the rear suspension spring by using a pair of tongs.

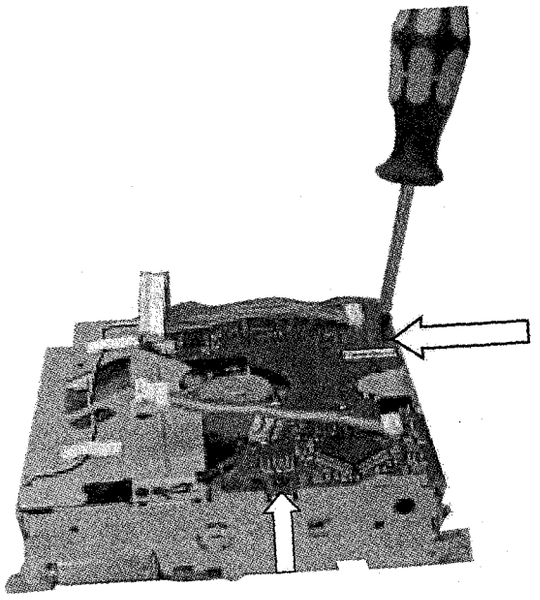

Figure iii

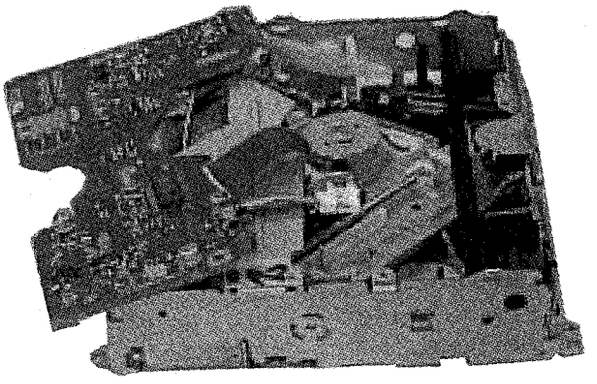

Figure iv

Unscrew the two pcb fixation screws and swing the pcb 180° above the rear bracket.

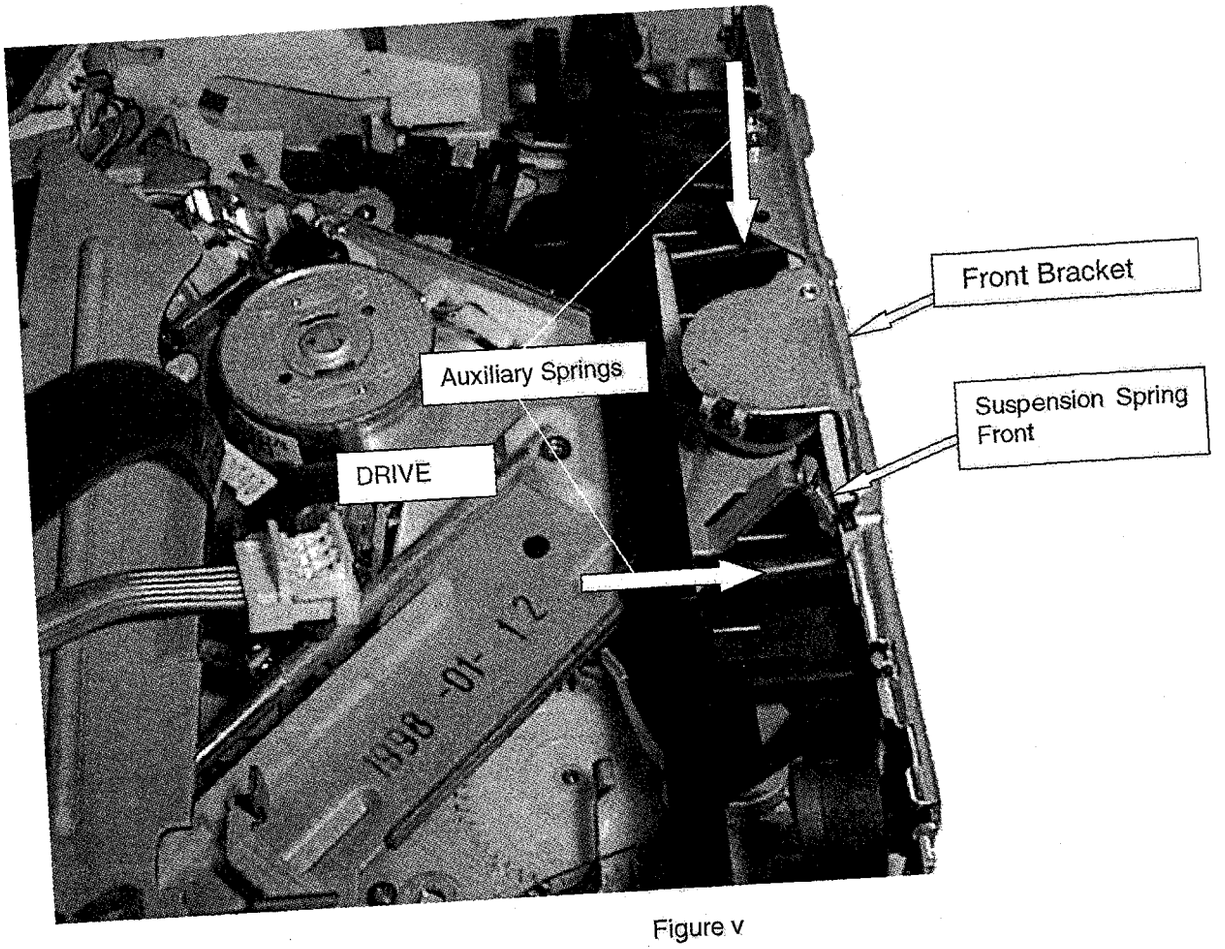

Figure v

Pull out the front suspension- and the auxiliary springs by using a pair of tongs (in the same way as it is shown for the rear suspension spring in figure ii).

First: Hang up the new springs.

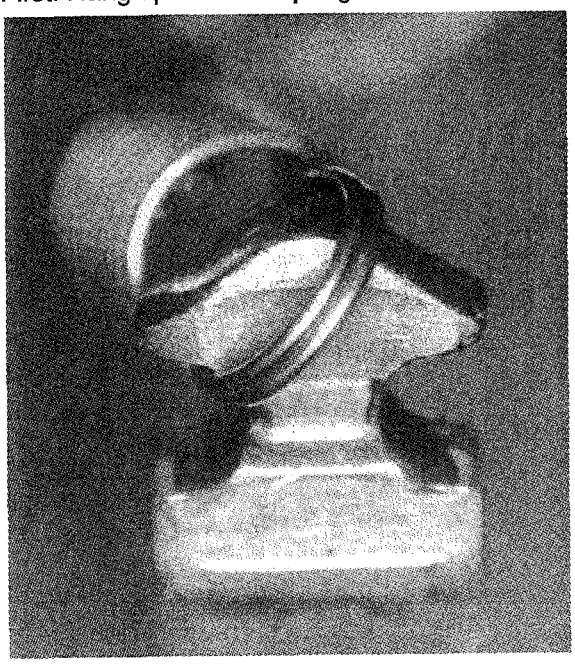

Figure vi

Second: Slide them into final position.

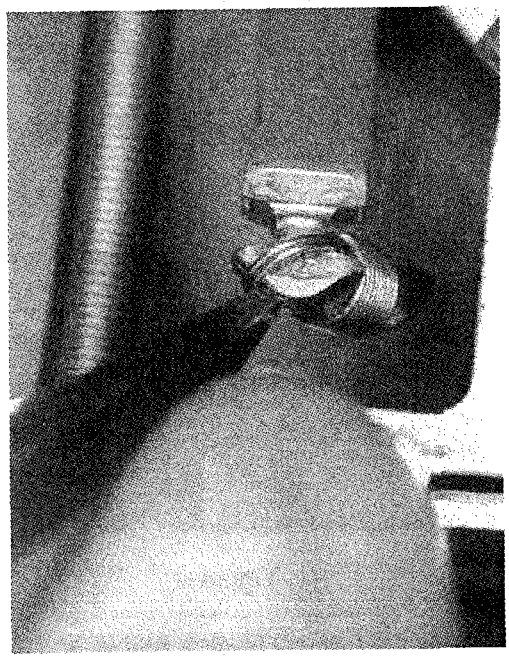

Figure vii

Hang up the front suspension - and the auxiliary springs by using a pair of sharp tweezers (type: EREM 00 d SA).

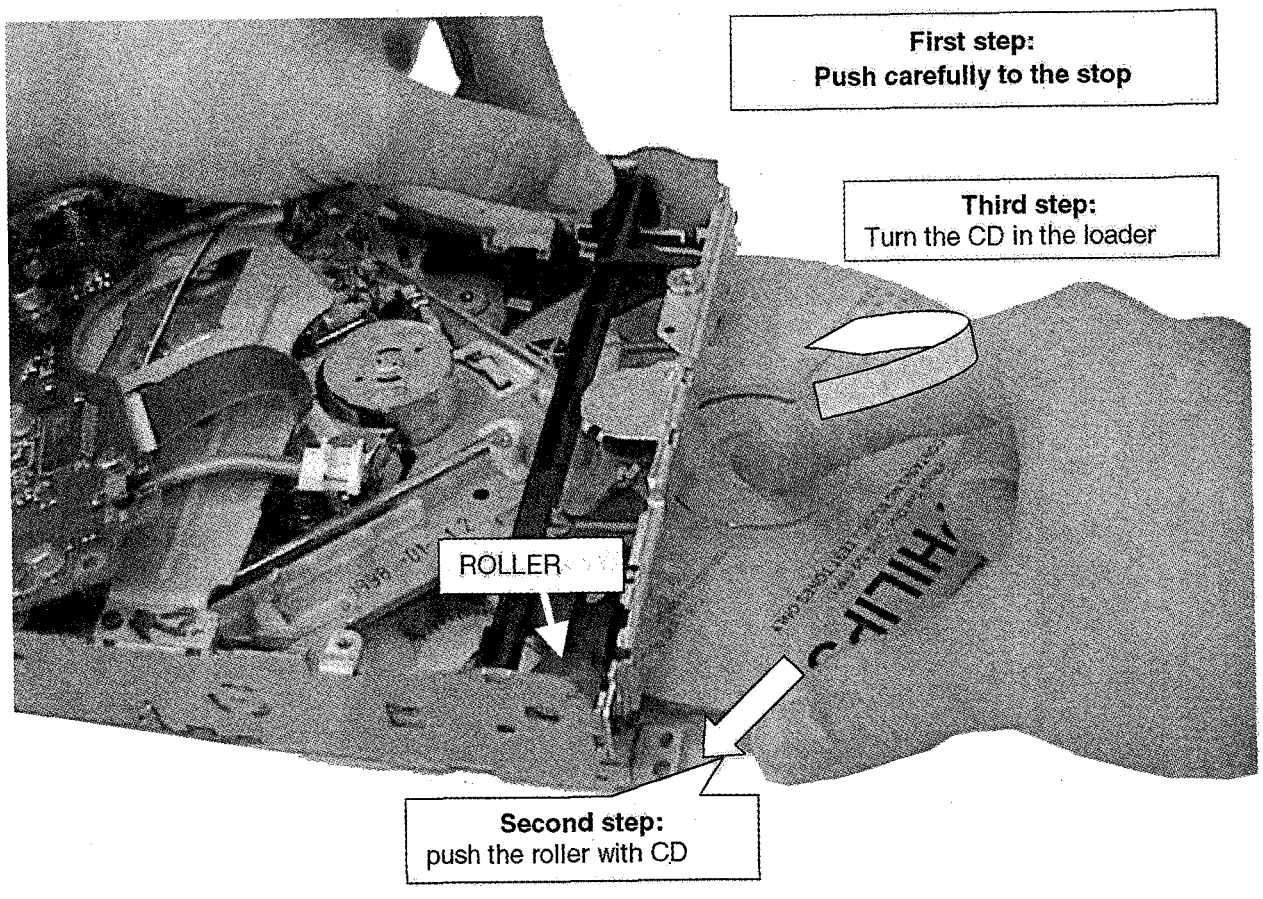

Figure viii

Spread of the lever left and the driving lever by using a CD ('Max. thickness' test CD 4822 397 30275 to be preferred).

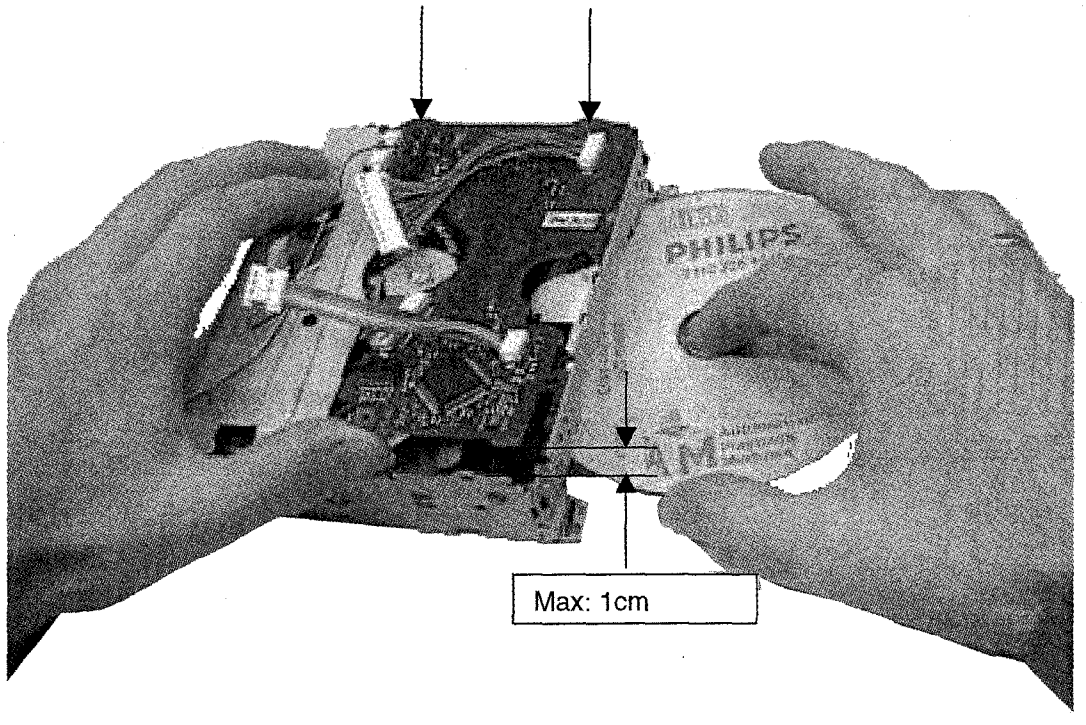

Figure ix

Swing the pcb and assemble it in the slots in the top cover.

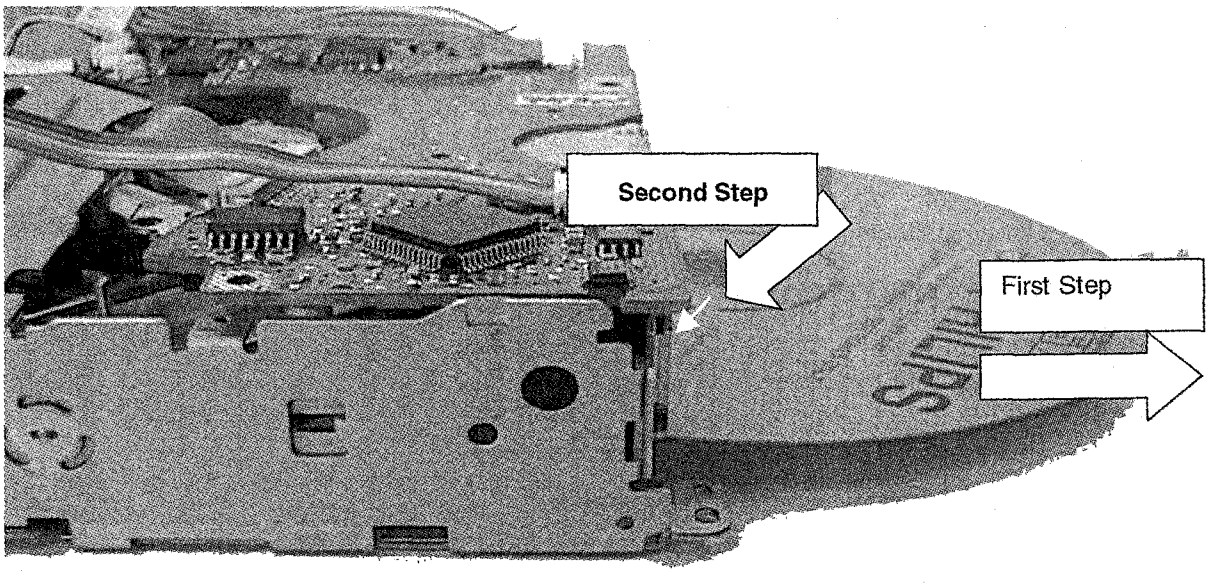

Figure x

Pull out the CD and assemble the pcb in the final position.

7.2 Service kit 4822 310 11146

Springs for mounting from –10 … +30 degrees

1 x front suspension spring

Number of turns : 9.5

Diameter of wire : 0.24 mm.

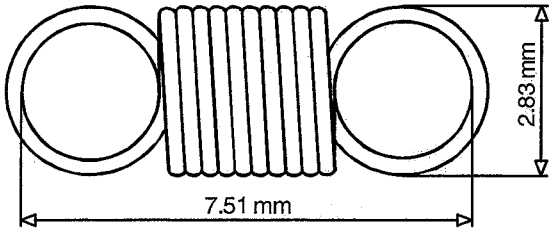

Figure xi

2 x front auxiliary springs

Number of turns : 43.75

Diameter of wire : 0.22 mm.

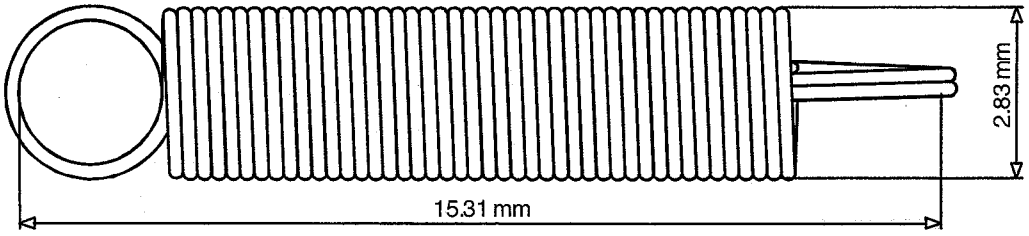

Figure xii

2 x rear suspension springs

Number of turns : 24

Diameter wire : 0.25 mm.

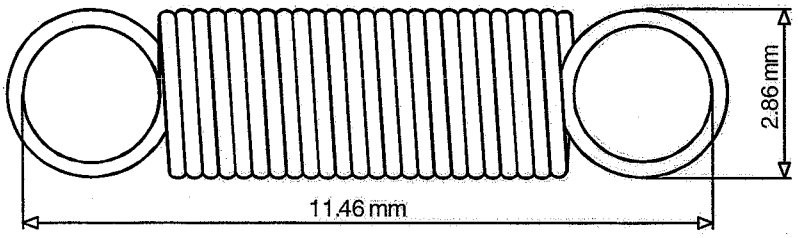

Figure xiii

8. CONNECTIONS

8.1 Connector CDM-M5/4.1

14 POLE CONNECTOR

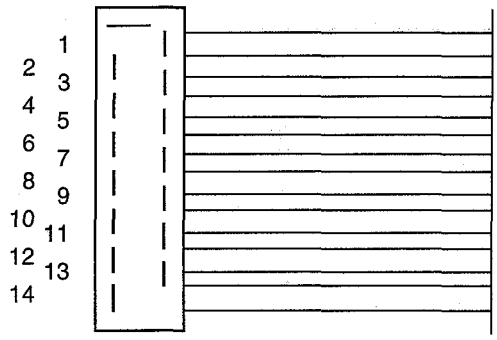

Figure xiv

Pin	Signal
1	INSERT SWITCH
2	POWER GROUND
3	V1(+8V)
4	SERIAL CLOCK - SCL
5	SERIAL DATA - SDA
6	BUS REQUEST - CRQ
7	V2(+3.3V)
8	µP RESET – CRST
9	GROUND
10	NOT USED
11	DIGITAL GROUND
12	AUDIO OUT LEFT
13	AUDIO GROUND
14	AUDIO OUT RIGHT

8.2 Connector CDM-M5/4.4

12 POLE CONNECTOR

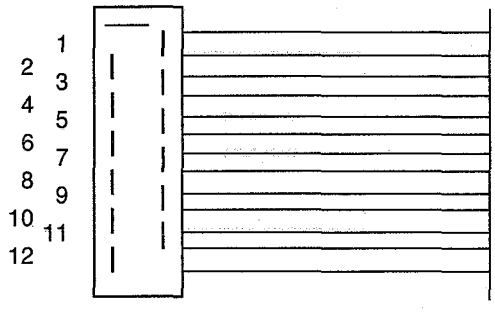

Figure xv

Pin	Signal
1	INSERT SWITCH
2	POWER GROUND
3	V1(+8V)
4	SERIAL CLOCK – SCL
5	SERIAL DATA – SDA
6	BUS REQUEST – CRQ
7	V2(+3.3V)
8	µP RESET – CRST
9	GROUND
10	S/P DIF
11	SIGNAL GROUND
12	NOT USED

9. BLOCK DIAGRAM

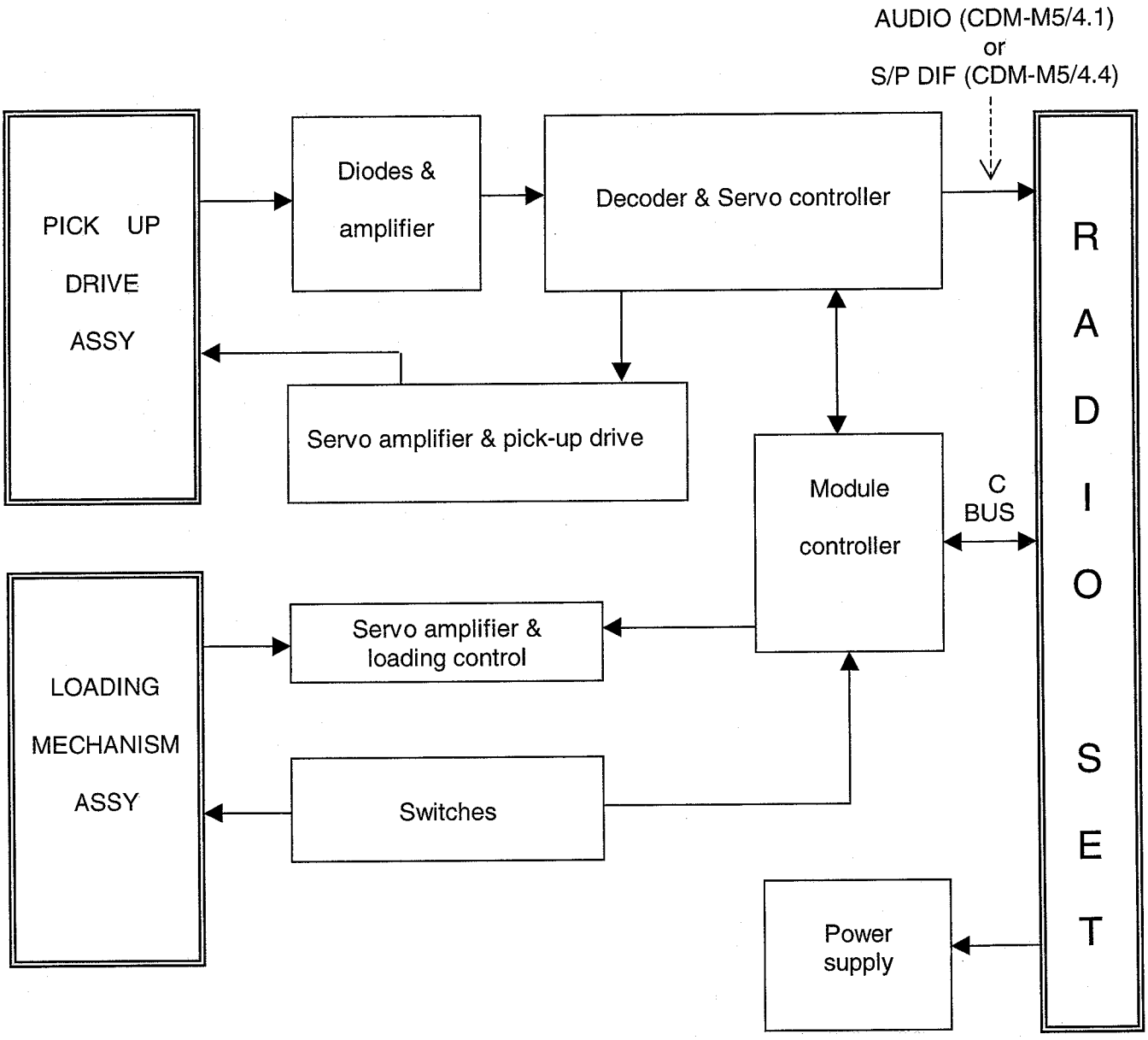

Figure xvi

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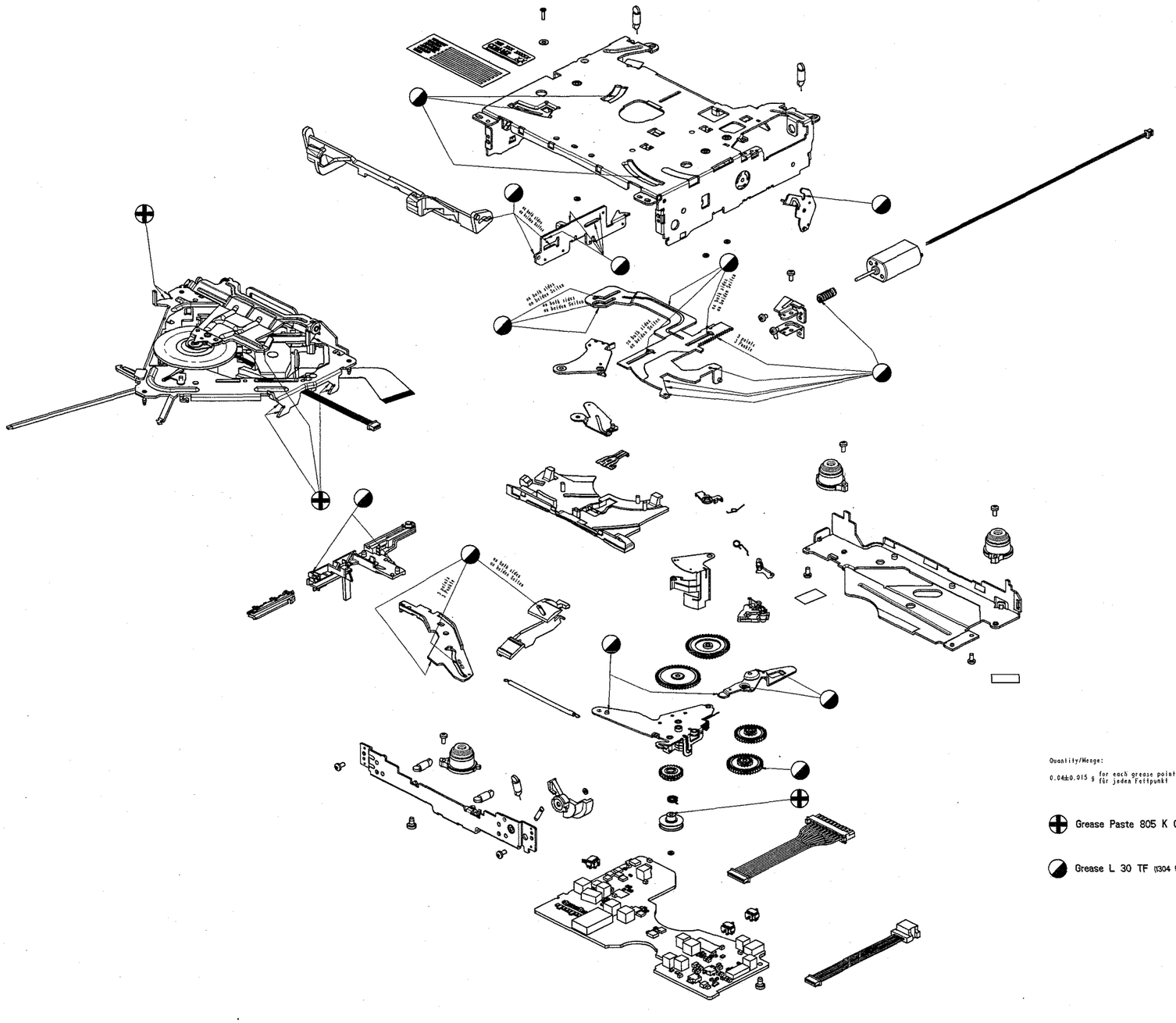
10. LUBRICATION OVERVIEWS

Note: *The CD module mechanism and drive assy do not require periodic cleaning and lubrication, <u>only</u> after repair !!*

10.1 Lubrication overview CD module mechanism

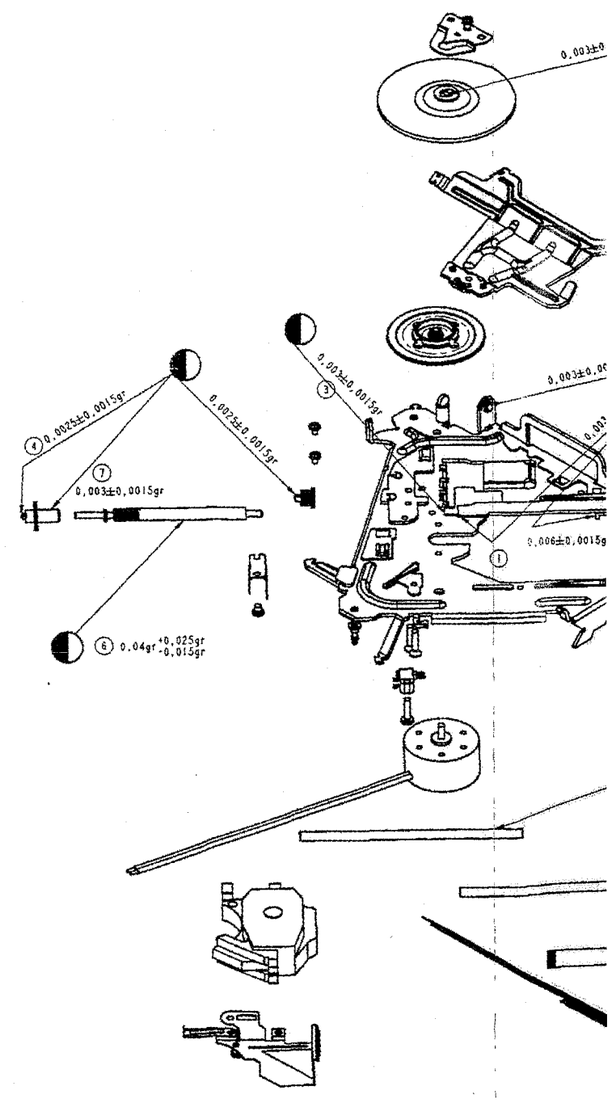


Quantity/Menge:
0.04±0.015 g for each grease point / für jeden Fettpunkt

Grease Paste 805 K Gleitmo (1312 505 03101)

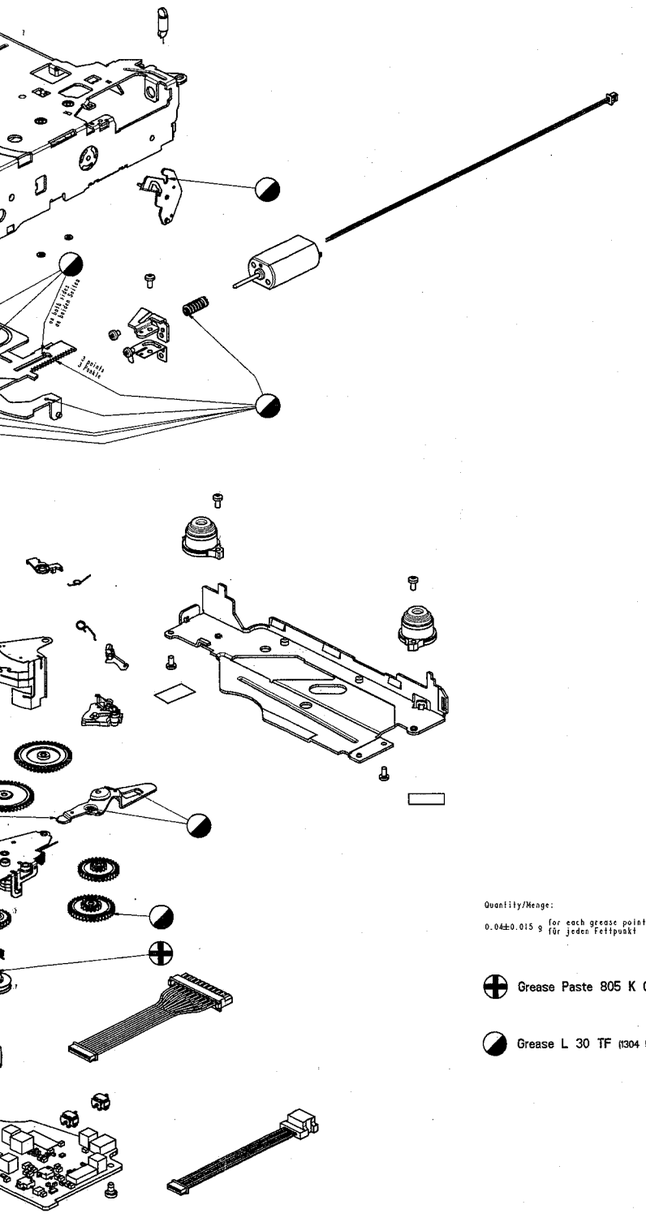
Grease L 30 TF (1304 523 17601)

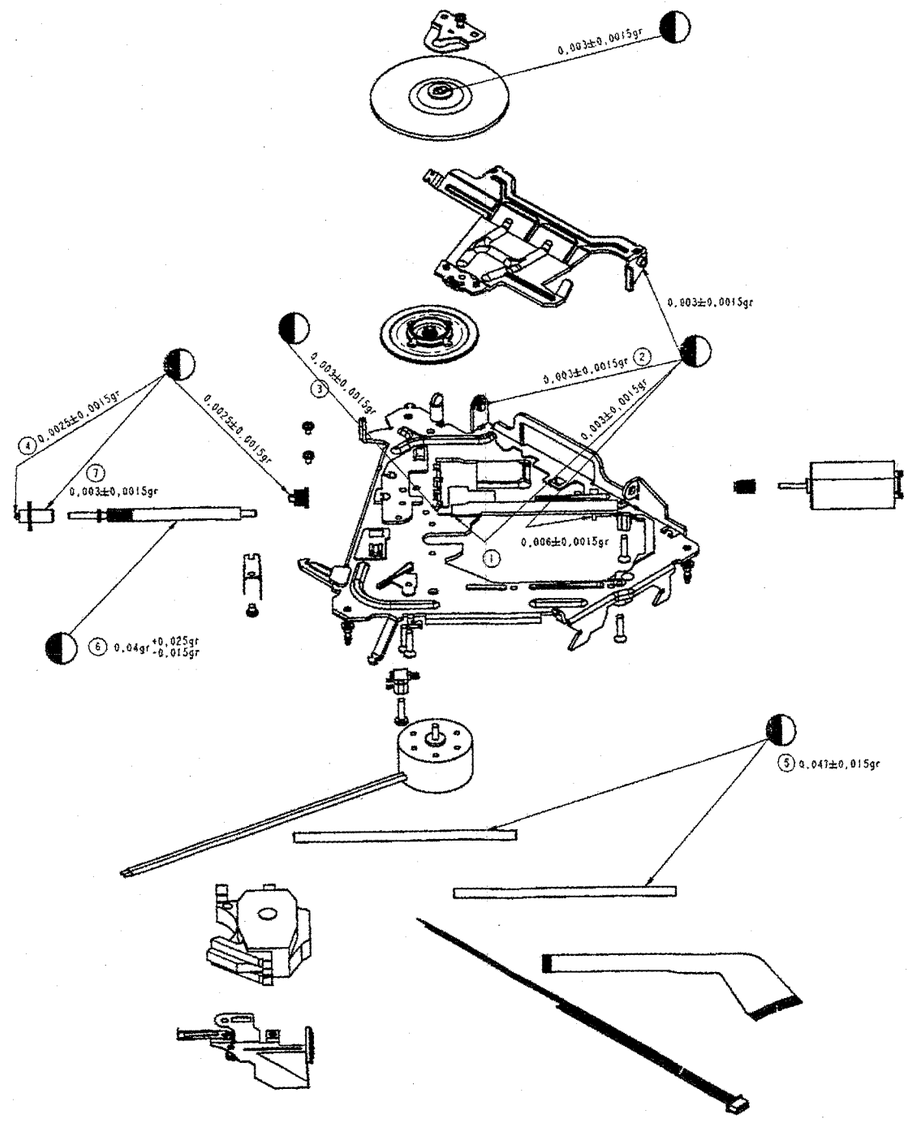
10.2 Lubrication overview drive assy



l lubrication, <u>only</u> after repair !!

10.2 Lubrication overview drive assy





① Bearing point of the feed gear assy
on the side of the sledge motor.
② The grease is put on the bearing point of the pressure plate.
③ The axle of the drive gear.
④ The grease is put on the bearing point of the feed gear assy.
on the side of the sledge motor (①)
⑤ Instead of the OPU we grease the surface of
the main pick shafts by using a special equipment.
⑥ We grease the surface of the feed gear. In this way
the grease disperses better on the length of the
feed gear.
⑦ After mounting

Quantity/Menge:

0.04±0.015 g for each grease point / für jeden Fettpunkt

Grease Paste 805 K Gleitmo (1312 505 03100)

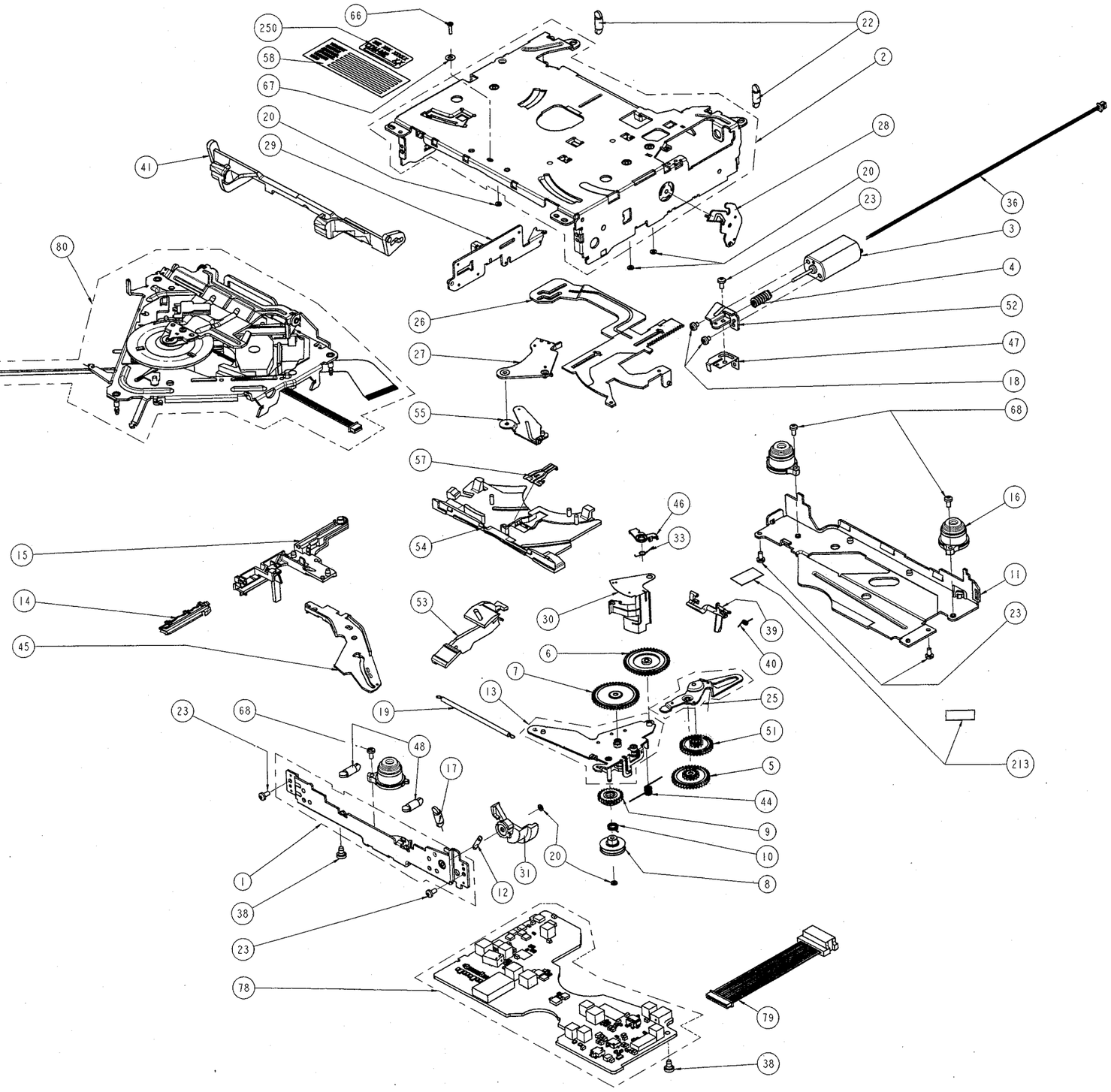
Grease L 30 TF (1304 523 17601)

Molykote
PG - 602 (1304 501 09801)

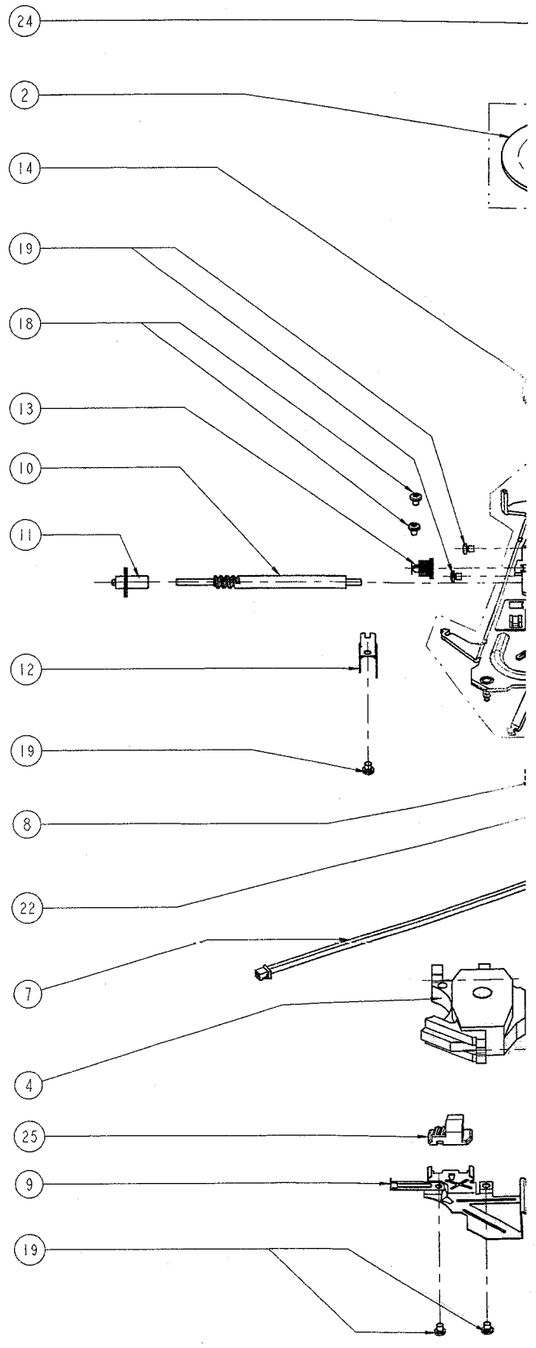
EXPLO_4.CDR

1. EXPLODED VIEWS

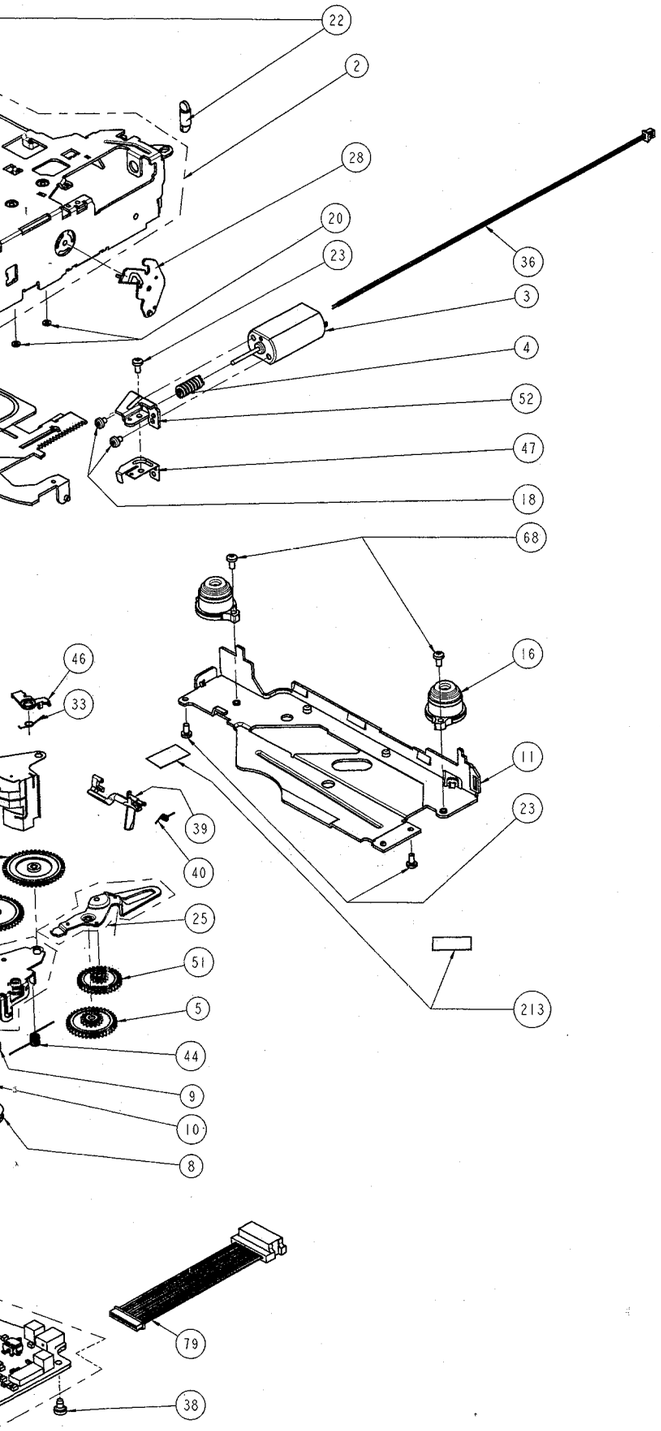
1.1 Exploded view CD module mechanism

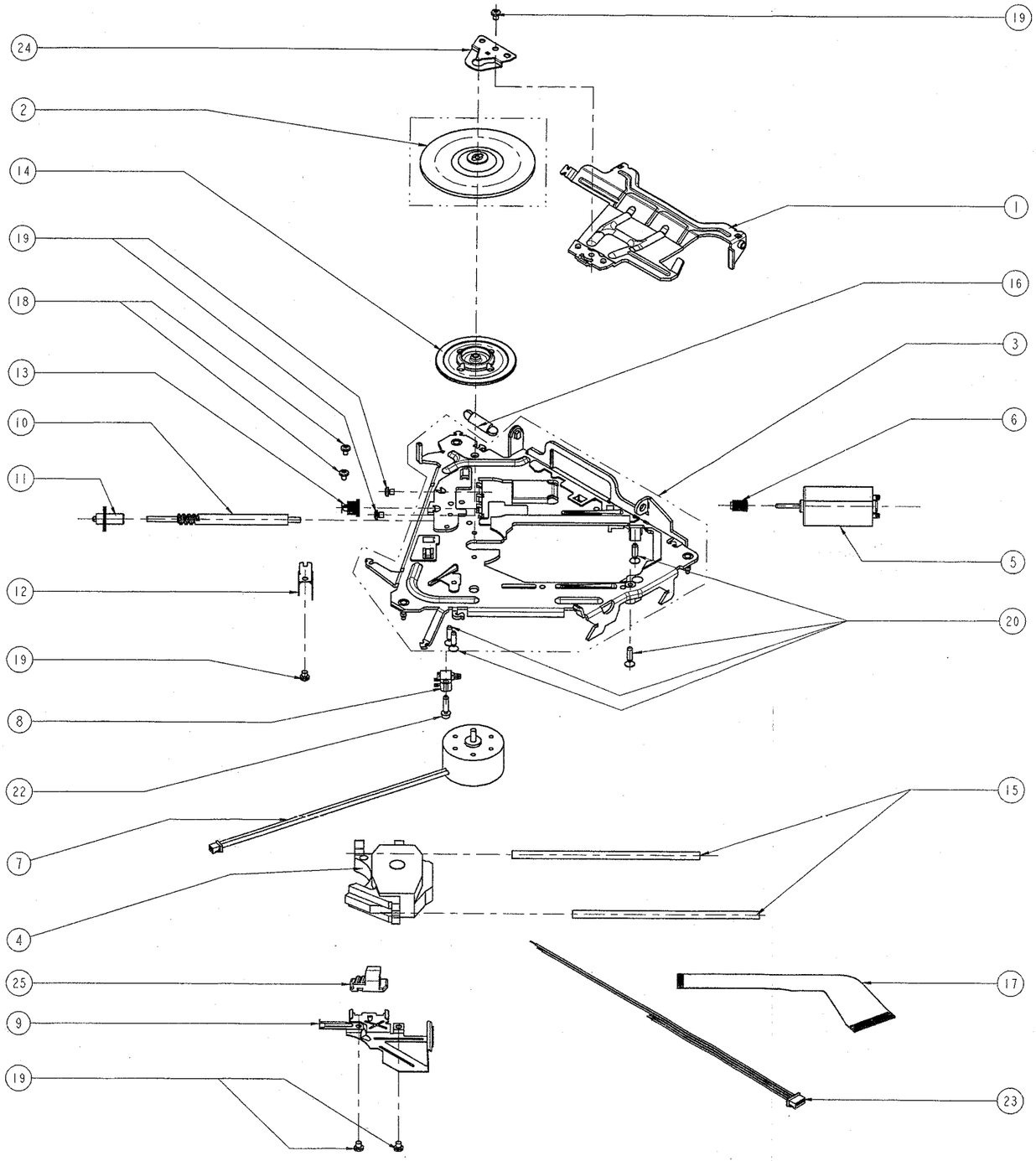


11.2 Exploded view drive assy



11.2 Exploded view drive assy





12. PARTS LISTS

Notes: *The CDM-M5 is subdivided into the following main parts:*
CD loader mechanism, drive (pick-up) unit, pcb and cable set.
However, the detailed exploded views both of the changer mechanism and the pick-up unit are inserted for completeness purposes and to clarify the maintenance – and disassembly procedures.

12.1 Mechanical parts

14	3112 658 10310	Loader assy complete
16	4822 529 10434	Damper assy
17/22/48	4822 310 11146	Spring kit for drive
20	4822 532 52348	Isolation ring
23	4822 502 12955	Screw M2x4
38	4822 502 14055	Screw M2.5x5
80	3112 358 24691	Drive assy
	4822 691 10792	CDM-M5/4.1 complete (with pcb / packed)
	3112 358 69600	CDM-M5/4.4 complete (with pcb / packed)

12.2 Electrical parts

78	3112 338 53160	PWB assy CDM-M5/4.4 digital output
79	3112 310 26120	Cable assy CDM-M5/4.4, 12-pole AMP Micromatch
94	3112 651 00051	Cable assy CDM-M5/4.1, 14-pole AMP Micromatch
95	3112 658 00093	PWB assy CDM-M5/4.1 analogue output

12.3 Accessories

(350)	4822 390 10143	Gleitmo 805K (80gr) lubrication paste
(351)	4822 390 10134	L30TF grease